

Date: Friday, 09/01/2009 12:43:05 PM  
User: Jean-Luc Menard

## Process Sheet

|                       |   |                  |                               |
|-----------------------|---|------------------|-------------------------------|
| Customer              | : CU-DAR001 Dart Helicopters Services   | Drawing Name     | : BLADE FITTING               |
| Job Number            | : 44530   |                  |                               |
| Estimate Number       | : 12299   |                  |                               |
| P.O. Number           | :   | Part Number      | : D3488041                    |
| This Issue            | : 09/01/2009 S.O. No. :   | Drawing Number   | : D3488 / DSK101              |
| Prsht Rev.            | : NC  | Project Number   | : N/A                         |
| First Issue           | : 1 / Type : MACHINED PARTS   | Drawing Revision | : B / D                       |
| Previous Run          | : 43730   | Material         | :                             |
| Written By            | : <u>Jul 09-01-09</u>   | Due Date         | : 16/01/2009 Qty: 10 Um: Each |
| Checked & Approved By | :   |                  |                               |
| Comment               | : Est Rev:A New Issue 06-02-28 JLM<br>Est Rev:B As per Rev B 06-03-30 JLM<br>Est Rev:C Now On Doosan Lathe JLM Verified BY:DD |                  |                               |

## Additional Product

Job Number:



|         |                       |               |
|---------|-----------------------|---------------|
| Seq. #: | Machine Or Operation: | Description : |
|---------|-----------------------|---------------|

|     |          |                        |
|-----|----------|------------------------|
| 1.0 | D6103003 | Round Billet, Aluminum |
|-----|----------|------------------------|



Comment: Qty.: 1.0000 Each(s)/Unit Total : 7.0000 Each(s)

Aluminum Round Billet D6103-003

Batch: IS45034

IS 42281 → 15/ank

SD

|     |              |              |
|-----|--------------|--------------|
| 2.0 | DOOSAN LATHE | DOOSAN LATHE |
|-----|--------------|--------------|



Comment: DOOSAN LATHE

1-Turn as per Dwg DSK 101 & Folio FA625

2-Deburr

SD / Jul 09/02/13

|     |     |  |
|-----|-----|--|
| 3.0 | QC2 | INSPECT PARTS AS THEY COME OFF MACHINE |
|-----|-----|--|



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

SD / Jul 09/02/13

|     |       |                                |
|-----|-------|--------------------------------|
| 4.0 | HAAS1 | HAAS CNC VERTICAL MACHINING #1 |
|-----|-------|--------------------------------|



Comment: HAAS CNC VERTICAL MACHINING #1

1-Machine as per Folio FA625 & Dwg D3488

2-Deburr

Jul 09/02/14

|     |     |  |
|-----|-----|--|
| 5.0 | QC2 | INSPECT PARTS AS THEY COME OFF MACHINE |
|-----|-----|--|



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

Jul 09/02/14

| W/O: |      | WORK ORDER CHANGES |    |      |     |                                     |                          |
|------|------|--------------------|----|------|-----|-------------------------------------|--------------------------|
| DATE | STEP | PROCEDURE CHANGE   | By | Date | Qty | Approval<br>Chief Eng /<br>Prod Mgr | Approval<br>QC Inspector |
|      |      |                    |    |      |     |                                     |                          |
|      |      |                    |    |      |     |                                     |                          |

Part No: D3488-041 PAR #: N/A Fault Category: Prod/Machined Parts NCR: Yes No DQA: D Date: 05/02/12

Resolution: Other Disposition: USE AS IS QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

| NCR: 44530 |      | WORK ORDER NON-CONFORMANCE (NCR)  |                                |  |                |                              |                       |                              |
|------------|------|---|--------------------------------|--|----------------|------------------------------|-----------------------|------------------------------|
| DATE       | STEP | Description of NC<br>Section A  | Corrective Action<br>Section B |  |                | Verification<br>Section C    | Approval<br>Chief Eng | Approval<br>QC Inspector     |
|            |      |   | Initial<br>Chief Eng           | Action Description<br>Chief Eng  | Sign &<br>Date |                              |                       |                              |
| 09/02/12   | 20   | chip accumulating between<br>bearing bar and piece causing<br>very poor finish. (x6)<br>R.L chip builds up on Boreing<br>Bar. | PH<br>09.02.12<br>QSI<br>042   | oversize hole. <del>2</del><br>max size is 2.205 but<br>is 2.160".     | PH<br>09/02/12 | PH<br>09.02.12<br>QSI<br>042 |                       | PH<br>09.02.12<br>QSI<br>042 |
|            |      |   |                                | SEE ATTACHED.<br>ACCEPTABLE<br>DEVIATION BASED ON<br>APPROVED ANALYSIS |                |                              |                       |                              |
| 09/02/13   | 20   | -C/bores too deep. Result<br>of workpiece being off<br>center .012.<br>-C/bores are .012<br>over tolerance at worst.          | PH<br>09.02.12<br>QSI<br>042   | ACCEPTABLE DEVIATION   | PH<br>09/02/12 | PH<br>09.02.12<br>QSI<br>042 |                       | PH<br>09.02.12<br>QSI<br>042 |

NOTE: Date & initial all entries

# Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BLADE FITTING

Job Number: 44530

Part Number: D3488041

Job Number:



Seq. #: Machine Or Operation: Description :

6.0

QC8

SECOND CHECK



Comment: SECOND CHECK

JL 09/02/17

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

BR 09-02-17

8.0

POWDER COATING

POWDER COATING



Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

START TIME:

3:15pm

OVEN TEMPERATURE:

320°F

FINISH TIME:

3:45pm

JL

09-02-17

9.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

FL 09/02/19

10.0

ALS71032225

INSERT



Comment: Qty.: 4.0000 Each(s)/Unit Total: 28.0000 Each(s)

Pick:

Qty Part Number Description Batch

4 ALS7-1032-225 Insert

m109817

FL

18

11.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Install Inserts as per Dwg D3488

FL

09/02/19

18

12.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

09/02/23

## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: BLADE FITTING

Job Number: 44530

Part Number: D3488041

Job Number:



Seq. #:

Machine Or Operation:

Description :

13.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and Stock

Location: 15P-02

*sl*

09-02-24

*(X10)*

14.0

QC21

FINAL INSPECTION/W/O RELEASE



09/02/24 *sl*

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



*MF 09-02-24*

|   |  |                     |         |
|---|--|---------------------|---------|
| <b>DART AEROSPACE LTD</b>   |  | <b>Work Order:</b>  | 44530   |
| <b>Description:</b> Blade Fitting, LH / Turning Detail for D3488-1/-2 |  | <b>Part Number:</b> | D3488-1 |
| <b>Inspection Dwg:</b> D3488 / DSK101 <b>Rev:</b> B / D               |  | <b>Page 1 of 2</b>  |         |

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article    ☐ Prototype

| Drawing Dimension    | Tolerance          | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|----------------------|--------------------|------------------|--------|--------|----------------------|----------|
| <b>Lathe Section</b> |                    |                  |        |        |                      |          |
| Ø2.150               | +/-0.005           | 2.150            | ✓      |        |                      |          |
| Ø2.780               | +/-0.005           | 2.780            | ✓      |        |                      |          |
| Ø3.125               | +/-0.010           | 3.125            | ✓      |        |                      |          |
| Ø3.346               | +/-0.010           | 3.346            | ✓      |        |                      |          |
| 0.125 x 45°          | +/-0.010 x +/-0.1° | .125 x 45°       | ✓      |        |                      |          |
| 8.000                | +0.030/-0.000      | 8.000            | ✓      |        |                      |          |
| 9.250                | +/-0.010           | 9.25             | ✓      |        |                      |          |
| 0.188                | +/-0.010           | .188             | ✓      |        |                      |          |
| R0.032               | +/-0.010           | R.032            | ✓      |        |                      |          |
| R0.062               | +/-0.010           | R.062            | ✓      |        |                      |          |
| Ø0.297               | +0.005/-0.001      | .297             | ✓      |        |                      |          |
| Ø0.430               | +/-0.010           | .430             | ✓      |        |                      |          |
| 0.100                | +/-0.010           | .100             | ✓      |        |                      |          |
| 0.125                | +/-0.010           | .125             | ✓      |        |                      |          |
| 2.620                | +/-0.010           | 2.620            | ✓      |        |                      |          |
| 3.500                | +/-0.010           | 3.500            | ✓      |        |                      |          |
| 1.005                | +/-0.010           | 1.005            | ✓      |        |                      |          |
| Ø0.484               | +0.005/-0.001      | .484             | ✓      |        |                      |          |
| 1.180                | +/-0.010           | 1.180            | ✓      |        |                      |          |
| 3.150                | +/-0.010           | 3.150            | ✓      |        |                      |          |
| 3.070                | +/-0.010           | 3.070            | ✓      |        |                      |          |
| R0.063               | +/-0.010           | R.063            | ✓      |        |                      |          |
|                      |                    |                  |        |        |                      |          |
|                      |                    |                  |        |        |                      |          |

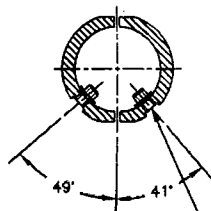
09/02/13

|   |  |                     |         |
|---|--|---------------------|---------|
| <b>DART AEROSPACE LTD</b>   |  | <b>Work Order:</b>  | 44536   |
| <b>Description:</b> Blade Fitting, LH / Turning Detail for D3488-1/-2 |  | <b>Part Number:</b> | D3488-1 |
| <b>Inspection Dwg:</b> D3488 / DSK101 <b>Rev:</b> B / D               |  | <b>Page 2 of 2</b>  |         |

| Drawing Dimension | Tolerance     | Actual Dimension | Accept | Reject | Method of Inspection | Comments |
|-------------------|---------------|------------------|--------|--------|----------------------|----------|
| Milling Section   |               |                  |        |        |                      |          |
| Ø0.508            | +0.006/-0.001 | 0.510            | —      |        |                      |          |
| 0.750             | +/-0.010      | 0.750            | —      |        |                      |          |
| 1.500             | +/-0.010      | 1.501            | —      |        |                      |          |
| 11.18             | +/-0.030      | 11.185           | —      |        |                      |          |
| R0.062            | +/-0.010      | R.062            | —      |        |                      |          |
| 0.125             | +/-0.010      | 0.130            | —      |        |                      |          |
| 0.590             | +/-0.010      | 0.592            | —      |        |                      |          |
| 0.793             | +/-0.010      | 0.801            | —      |        |                      |          |
| 1.351             | +/-0.010      | 1.343            | —      |        |                      |          |
| 1.317             | +/-0.010      | 1.320            | —      |        |                      |          |
| 1.802             | +/-0.010      | 1.804            | —      |        |                      |          |
|                   |               |                  |        |        |                      |          |
|                   |               |                  |        |        |                      |          |
|                   |               |                  |        |        |                      |          |

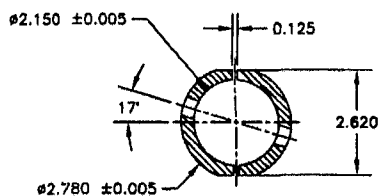
|                     |                    |                    |          |                            |     |
|---------------------|--------------------|--------------------|----------|----------------------------|-----|
| <b>Measured by:</b> | <i>[Signature]</i> | <b>Audited by:</b> | J.L      | <b>Prototype Approval:</b> | N/A |
| <b>Date:</b>        | 09/02/14           | <b>Date:</b>       | 09/02/17 | <b>Date:</b>               | N/A |

| Rev | Date     | Change                  | Revised by | Approved           |
|-----|----------|-------------------------|------------|--------------------|
| A   | 06.03.31 | New Issue               | KJ/JLM     |                    |
| B   | 08.09.19 | Reformat P/O D3488-041  | KJ/JLM     |                    |
| C   | 08.12.02 | Dimension 8.000 removed | KJ/JLM     | <i>[Signature]</i> |



SECTION B-B

#0.297  
C'BORE #0.430 x 0.100  
INSTALL ALS4-1032-225 (OR AKS4-1032-225  
OR ALS7-1032-225 OR AKS7-1032-225)  
INSERTS AFTER FINISH  
(4 PLACES)



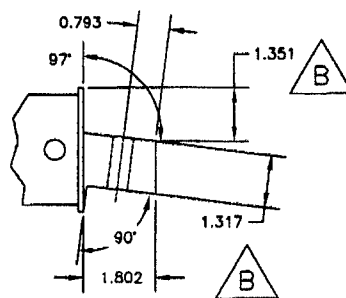
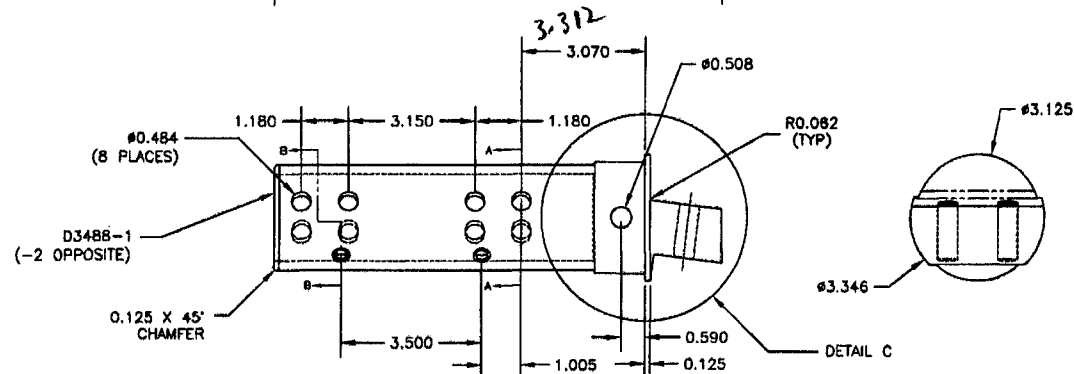
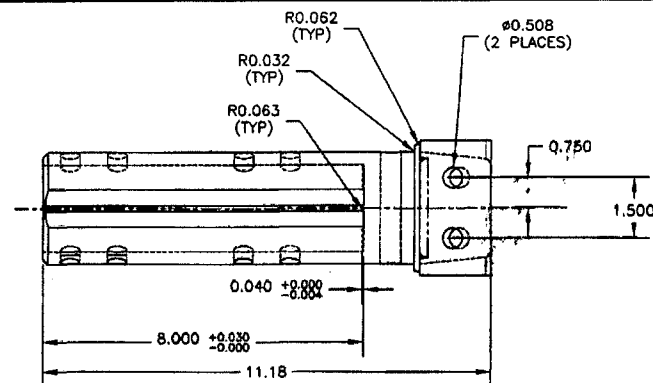
SECTION A-A

**D3488-041/-042 BLADE FITTING ASSEMBLY PARTS LIST**

| QTY<br>-041 | QTY<br>-042 | PART NUMBER   | DESCRIPTION                 |
|-------------|-------------|---|-----------------------------|
| X           | X           | D3488-041   | BLADE FITTING ASSEMBLY (LH) |
|             |             | D3488-042   | BLADE FITTING ASSEMBLY (RH) |
| 1           |             | D3488-1   | BLADE FITTING (LH)          |
|             | 1           | D3488-2   | BLADE FITTING (RH)          |
| 4           | 4           | ALS4-1032-225<br>OR AKS4-1032-225<br>OR ALS7-1032-225<br>OR AKS7-1032-225 | INSERT                      |

**D3488-041/-042 BLADE FITTING**

- MATERIAL: MAKE D3488-1/-2 FROM ALUMINUM 7075-T7351 ROUND BAR PER QQ-A-225/9 (REF. DART MATERIAL SPEC M7075T73R)
- FINISH: ACID ETCH, ALODINE PER DART QSI 005 4.1 POWDER COAT WHITE (REF 4.3.5.1) PER DART QSI 005 4.3
- BREAK UNMARKED SHARP EDGES 0.010 TO 0.020
- INSTALL INSERTS AFTER POWDER COAT
- ALL DIMENSIONS ARE IN INCHES
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED



DETAIL C

D3488-041 SHOWN (D3488-042 OPPOSITE)

**RELEASED**  
06.03.15 PH  
PER DS  
ELN #789

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|         |          |  |
|---------|----------|--|
| B       | 06.03.15 | CHANGE THICKNESS                             |
| A       | 05.12.20 | NEW ISSUE                                    |
| DESIGN  | PH       | DRAWN BY PH                                  |
| CHECKED | PH       | APPROVED PH                                  |
| DATE    | 06.03.15 | TITLE  |
|         |          | BLADE FITTING                                |
|         |          | DART AEROSPACE USA, INC.<br>PORT HADLOCK, VA |
|         |          | DRAWING NO. D3488                            |
|         |          | REV. B                                       |
|         |          | SHEET 1 OF 1                                 |
|         |          | SCALE  |
|         |          | 1:3  |

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<http://www.dartaero.com>

## STRESS REPORT

SR-D350-636-2

# Skidtube Installation

EUROCOPTER AS 350/355 MODELS

W/0 44530  
Prepared By: P. Hum  
P. Hum  
Mechanical Designer

Checked By: D. Shepherd  
D. Shepherd  
P. Eng.

Released By: D. Shepherd  
D. Shepherd  
P. Eng.

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Revision: **B**

Date: 06.02.23

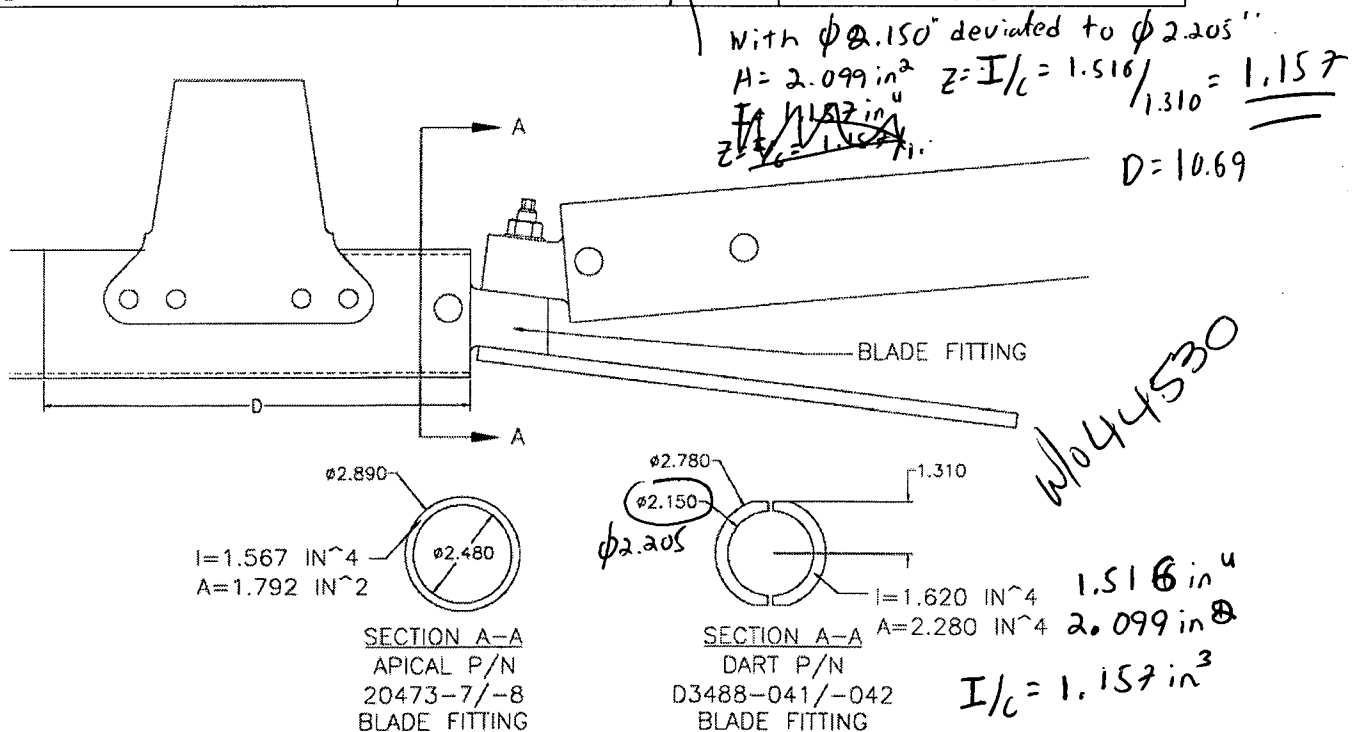


For installation of the Apical Tri-bag and Apical Cylindrical Float bag systems onto OEM skidtube; it is required that the OEM P/N 350A41-1077-24/-25 blade fitting be substituted with the Apical P/N 20473-7/-8 blade fitting. In the proposed Dart skidtube configuration, the Dart D3488-041/-042 blade fitting will replace the Apical P/N 20473-7/-8 blade fitting.

In the Dart system, blade fitting D3488-041/-042 will be used to transfer load into the web of the skidtube assembly. On the outside of the skidtube, D3488-041/-042 is dimensionally identical to the Apical P/N 20473-7/-8 blade fitting and is manufactured from the same 7075-T7351 material. Therefore, the Dart blade fitting and the Apical blade fitting have identical structural capability. The longitudinal location of the holes on the D3488-041/-042 blade fitting used to mount the aft crosstube are identical to the Apical P/N 20473-7/-8 blade fitting. On the inside of the skidtube, D3488-041/-042 has been designed to withstand higher bending moments than the Apical fitting.

The following table compares the Dart D3488-041/-042 blade fitting to the Apical 20473-7/-8 blade fitting.

| Component  | Dart D3488-041/-042                                | Apical P/N 20473-7/-8                           |
|--|--|---|
| Material   | 7075-T7351 per QQ-A-225/9                          | 7075-T7351 per QQ-A-225/9                       |
| (I) Moment of Inertia of portion inside skidtube | 1.620 in <sup>4</sup><br>(from D3488-041/-042 dwg) | 1.567 in <sup>4</sup><br>(from D20473-7/-8 dwg) |
| (C) Distance to outer fibers                     | 1.310 in<br>(from D3488-041/-042 dwg)              | 1.445 in<br>(from 20473-7/-8 dwg)               |
| (A) Area at section A-A                          | 2.280 in <sup>2</sup>                              | 1.792 in <sup>2</sup>                           |
| Z=I/C at section A-A                             | 1.234 in <sup>3</sup>                              | 1.084 in <sup>3</sup>                           |
| D  | 10.69 in   | 10.53 in  |



Because the material used to manufacture both blade fittings is identical, the fact that the I/C, A, and D for the Dart blade fitting is greater than the I/C, A, and D for the Apical blade fitting demonstrates that the Dart blade fitting can withstand higher bending moments and shear loads than the Apical blade fitting and less localized load is transferred into the surrounding skidtube at the fwd end of the blade fitting.

Finally, the Dart skidtube installation does not change any of the Apical hardware required to install the floats onto the skidtube or attach the aft extension onto the blade fitting. Therefore, this hardware is acceptable by identity.

#### 4.0 Conclusion

Based on the qualitative analysis presented in this report, it has been demonstrated that the Dart D350-636-011/-012/-013/-014 skidtubes will be as good or better than the OEM 350A41-1016-1061/-1063/-1070/-1161/-1163/-1171 skidtube in terms of withstanding the loads from the Apical Cylindrical and Tri-bag float system. Additionally, this report demonstrates that the Dart skidtube can withstand localized bearing load with substantial margins of safety.

Wb 44530